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EXAMINER

KIM, CHONG R

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 09/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/054,274

Applicant(s)

HIROSE ET AL.

Examiner

Charles Kim

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 November 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 01/18/02.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 9-11, 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Referring to claim 9, the phrase "said partial image" in line 2 lacks antecedent basis.

Appropriate correction is required.

Referring to claim 13, the phrase "proper search condition" in line 3 renders the claim indefinite because it is unclear what the term "proper" means.

Claims not mentioned specifically are dependent from indefinite antecedent claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

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2. Claims 1, 5, 7, 9, 12, 14-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Skoll et al., U.S. Patent No. 6,684,379 ("Skoll").

Referring to claim 1, Skoll discloses a method of managing surface images of thin-film devices comprising the steps of:

a. picking up at least one die region on a wafer surface by image pickup means to produce the whole image of the region (col. 8, lines 47-56. Note that the "die photo" in line 50 is interpreted as the whole image of the region);

b. storing data of the whole image in memory means so that the data can be output from the memory means (col. 7, lines 37-57 and col. 9, lines 19-36).

Referring to claim 5, Skoll further discloses the steps of picking up a desired portion of the one die region to produce a detailed image (232) of the desired portion and displaying the detailed image and the whole image (230) together by display means so that these images can be observed at a time (col. 9, lines 19-36 and figure 5).

Referring to claim 7, Skoll further discloses that information of particle obtained separately without using the step of picking up can be output together with the whole image (col. 10, lines 10-24 and figure 7. Note that the "design and layout information" in line 23 is interpreted as being analogous to the "information of particle").

Referring to claim 9 as best understood, Skoll further discloses that the whole image is subjected to image processing so that the image obtained by the processing can be output (col. 9, lines 19-36).

Referring to claim 12, Skoll further discloses that desired information is extracted by comparing the whole image and design information (col. 9, lines 9-42).

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Referring to claim 14, see the rejection of at least claim 1 above.

Referring to claim 15, Skoll further discloses a display means for displaying the whole image stored in the memory means (figures 4 and 6).

Referring to claim 16, see the rejection of at least claim 5 above.

Referring to claim 17, Skoll discloses a management system for surface image of thin-film device comprising:

- a. image pickup means (126) for picking up at least one die region on a wafer surface (col. 8, lines 47-56);
- b. memory means (220) for storing data of a whole image of the region picked up by the image pickup means (col. 7, lines 37-57 and col. 9, lines 19-36. Note that the "die photo" in col. 9, line 29 is interpreted as the whole image of the region);
- c. a plurality of display means (220) for displaying the whole image stored in the memory means, these display means being connected to the memory means through lines of communication (col. 12, lines 32-38).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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3. Claims 2-4, 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Skoll et al., U.S. Patent No. 6,684,379 ("Skoll") and Katzir et al., U.S. Patent Application Publication No. US 2003/0006364 ("Katzir").

Referring to claim 2, Skoll does not explicitly disclose that the image pickup means is a two-dimensional imaging device. However, this feature was exceedingly well known in the art. For example, Katzir discloses a two-dimensional imaging device for imaging a wafer surface (page 1, paragraph 3).

Skoll and Katzir are combinable because they are both concerned with managing surface images of thin-film devices. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image pickup means of Skoll so that it is a two-dimensional imaging device, as taught by Katzir. The suggestion/motivation for doing so would have been to obtain an accurate image of the wafer surface, thereby enhancing the imaging process. Therefore, it would have been obvious to combine Skoll with Katzir to obtain the invention as specified in claim 2.

Referring to claim 3, Skoll further discloses that the step of picking up includes picking up a plurality of portions of the one die region separately by the imaging device, and composing the resulting partial (tile) images to produce the whole image (col. 8, lines 47-56 and col. 9, lines 19-36).

Skoll does not explicitly disclose that the image pickup means is a two-dimensional imaging device. However, this feature was exceedingly well known in the art. For example, Katzir discloses a two-dimensional imaging device for picking up a plurality of portions of a

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wafer surface, and composing the partial images to produce a whole image (page 1, paragraphs 3 and 10).

Skoll and Katzir are combinable because they are both concerned with managing surface images of thin-film devices. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image pickup means of Skoll so that it is a two-dimensional imaging device, as taught by Katzir. The suggestion/motivation for doing so would have been to obtain an accurate image of the wafer surface, thereby enhancing the imaging process. Therefore, it would have been obvious to combine Skoll with Katzir to obtain the invention as specified in claim 3.

Referring to claim 4, Skoll further discloses that the step of picking up includes picking up a plurality of portions of the one die region separately by the imaging device, and composing the resulting partial (tile) images to produce the whole image (col. 8, lines 47-56 and col. 9, lines 19-36).

Skoll does not explicitly disclose that the image pickup means is a one-dimensional imaging device. However, this feature was exceedingly well known in the art. For example, Katzir discloses a one-dimensional imaging device for imaging a wafer surface (page 1, paragraph 3).

Skoll and Katzir are combinable because they are both concerned with managing surface images of thin-film devices. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image pickup means of Skoll so that it is a one-dimensional imaging device, as taught by Katzir. The suggestion/motivation for doing so would have been to obtain an accurate image of the wafer surface, thereby enhancing the imaging

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process. Therefore, it would have been obvious to combine Skoll with Katzir to obtain the invention as specified in claim 4.

Referring to claim 18, Skoll discloses a method of manufacturing thin-film devices comprising the steps of:

- a. picking up at least one die region on a wafer surface by image pickup means to produce the whole image (230) of the region (col. 8, lines 47-56. Note that the "die photo" in line 50 is interpreted as the whole image of the region);
- b. storing data of the whole image (230) in memory means so that the data can be output from the memory means (col. 7, lines 37-57 and col. 9, lines 19-36);
- c. picking up a desired portion of the one die region to produce a detailed image (232) of the portion (col. 9, lines 19-36 and figure 5).

Skoll does not explicitly disclose that the detailed image and the whole image are used to decide if the dies formed on the wafer are non-defective or defective. However, this feature was exceedingly well known in the art. For example, Katzir discloses that a detailed image (partially overlapping images) of a wafer surface and a whole image (composite image) are used to decide if the wafers are non-defective or defective (page 1, paragraph 10).

Skoll and Katzir are combinable because they are both concerned with managing surface images of thin-film devices. Skoll is concerned with detecting flaws in the design analysis of the die (col. 15, lines 8-11). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to utilize the detailed and whole image of Skoll to decide if the dies formed on the wafer are non-defective or defective, as taught by Katzir. The suggestion/motivation for doing so would have been to enhance the die manufacturing/design

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process providing the capability of detecting a defective die. Therefore, it would have been obvious to combine Skoll with Katzir to obtain the invention as specified in claim 18.

Referring to claim 19, Katzir further discloses that the defect tendency is extracted on the basis of the whole image (page 1, paragraph 10).

Referring to claim 20, see the rejection of at least claim 18 above.

4. Claims 6, 10, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Skoll et al., U.S. Patent No. 6,684,379 ("Skoll").

Referring to claim 6, Skoll further discloses that the detailed image (232) is magnified (zoomed) at a desired magnifying power so that it can be displayed in a magnified form (col. 9, lines 59-63), but does not explicitly disclose that the whole image is magnified or reduced. However, Official notice is taken that magnifying or reducing a whole image of a region was exceedingly well known in the art. Therefore, it would have been obvious to a person of ordinary skill in the art to magnify or reduce the whole image of Skoll. The suggestion/motivation for doing so would have been to facilitate the design analysis process by displaying a desired size image to the engineer analyst.

Referring to claim 10, Skoll does not explicitly disclose that the image processing extracts a proposed region of film thickness measurement point. However, Skoll explains that the image processing extracts an "area of interest" in the die image (col. 9, lines 29-37). Furthermore, Skoll is concerned with extracting the design and layout information of the die region (col. 9, lines 9-13). Therefore, it would have been obvious to set this "area of interest" as a proposed region of film thickness measurement point. The suggestion/motivation for doing so

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would have been to extract design and layout information of the die region for analytic purposes (col. 9, lines 9-13).

Referring to claim 13 as best understood, Skoll does not explicitly disclose that the whole image stored in the memory means is searched for under a search condition, and the result of the searching can be output. However, Official notice is taken that searching an image stored in a memory means under a search condition and outputting the result was exceedingly well known in the art. Therefore, it would have been obvious to a person of ordinary skill in the art to search the whole image in the memory means of Skoll under a search condition and output the result. The suggestion/motivation for doing so would have been to allow the engineer analyst to retrieve the image at a later time more efficiently.

5. Claims 8 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Skoll et al., U.S. Patent No. 6,684,379 ("Skoll") and Cabib et al., U.S. Patent No. 5,856,871 ("Cabib").

Referring to claim 8, Skoll further discloses the step of obtaining measurements of the die region (col. 8, lines 42-45 and col. 12, lines 38-43), but does not explicitly disclose the step of obtaining information of film thickness separately from the imaging step.

Cabib discloses the step of obtaining film thickness information of a wafer (col. 3, lines 20-39).

Skoll and Cabib are combinable because they are both concerned with semiconductor wafer imaging systems. Skoll is concerned with extracting the design and layout information of the die region (col. 9, lines 9-13). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Skoll to include the step of obtaining

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information of film thickness, as taught by Cabib. The suggestion/motivation for doing so would have been to provide a fast and accurate method for obtaining design and layout information of the wafer, thereby enhancing the efficiency of the wafer manufacturing/inspection process (Cabib, col. 1, lines 34-42 and col. 4, lines 1-6). Therefore, it would have been obvious to combine Skoll with Cabib to obtain the invention as specified in claim 8.

Referring to claim 11, Skoll does not explicitly disclose that the image processing detects a film thickness distribution. However, this feature was exceedingly well known in the art. For example, Cabib discloses an image processing technique for detecting a film thickness distribution (col. 3, lines 20-59).

Skoll and Cabib are combinable because they are both concerned with semiconductor wafer imaging systems. Skoll is concerned with extracting the design and layout information of the die region (col. 9, lines 9-13). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image processing of Skoll so that it detects a film thickness distribution, as taught by Cabib. The suggestion/motivation for doing so would have been to provide a fast and accurate method for obtaining design and layout information of the wafer, thereby enhancing the efficiency of the wafer manufacturing/inspection process (Cabib, col. 1, lines 34-42 and col. 4, lines 1-6). Therefore, it would have been obvious to combine Skoll with Cabib to obtain the invention as specified in claim 11.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 703-306-4038. The

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examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am to 6:00pm.

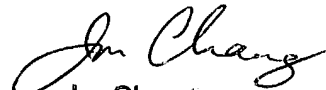
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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September 22, 2004


Jon Chang
Primary Examiner